BUILDING ENERGY SIMULATION

For Users of EnergyPlus, SPARK, DOE-2, BLAST, Genopt, Building Design Advisor, ENERGY-10 and their Derivatives

Users News

What's New ?

EnergyPlus an Award(s) Winner!

The EnergyPlus team has won an award for excellence in technology transfer from the Federal Laboratory Consortium, an organization of more than 700 major federal laboratories, centers and their parent agencies. EnergyPlus has also won the 2001 DOE Award for Information Technology. Get a free copy of EnegyPlus from **http://www.energyplus.gov**

Download VisualSPARK 1.0.1

Version 1.0.1 of VisualSPARK is available as a a free download. Go to http://SimulationResearch.lbl.gov and click on VisualSPARK 1.0.1 in the left menu. User manuals are available as PDF files.

Model 1,000 Zones with DOE-2

DOE-2.1E, version 117, allows you to model up to 1,000 zones. It's offered at the same price as version 110. To order, email **Ed Kidd** at **estsc@adonis.osti.gov**

Also, the DOE-2.1E *BDL Summary* has been updated to reflect the new limits on zones and other components. Download Update #4 from our website. Details are on p. 4.

DOE-2 Resource Center in Poland

Victoria Polska, an energy management company with offices in Gdansk and Warsaw, is the newest DOE-2 Resource Center. **Tom Gibney**, Managing Director, is the primary contact.

Victoria Polska
ul. Wodarzewska 65e/2
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Poland
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IBPSA-USA Free Membership

The IBPSA-USA Board of Directors has waived the annual membership fee for 2002; see p. 14.

What's Inside ?

SPARK is an equation-based simulation environment that allows you to build customized models of complex physical processes by connecting calculation objects that represent system components like walls, fans, heat exchangers, chillers, ducts, mixing boxes, controls, etc. It is aimed at the simulation of innovative and/or complex building systems that are beyond the scope of whole-building programs like DOE-2 and EnergyPlus. VisualSPARK adds a graphical user interface to SPARK to simplify use of the program.

VisualSPARK 1.0.1

VisualSPARK 1.0.1 is available free of charge from Lawrence Berkeley National Laboratory.

http://SimulationResearch.lbl.gov > VisualSPARK

The main elements of VisualSPARK are

- ♦ a user interface
- ♦ a network specification language
- ♦ graph-theoretic reduction methods to reduce the number of iteration variables
- ♦ a solver for solving simultaneous algebraic and differential equations
- ♦ a processor for graphically displaying results
- ♦ a model library of HVAC components and systems

With the network specification language you create equation-based calculation objects, and link the objects into networks that represent a building's envelope or HVAC components or systems. The solver solves this network for user-specified input parameters. With the results processor you graphically display the results of the calculation. Graph-theoretic reduction techniques automatically reduce the number of iteration variables, allowing VisualSPARK to obtain a solution of iteration variables, allowing VisualSPARK to obtain a solution 10 to 20 times faster than similar programs. VisualSPARK runs under the Windows 95/98/NT/2000, SunOS, Solaris and Linux operating systems.

Improvements to VisualSPARK 1.0.1

Graphical User Interface

- ♦ New examples have been added to the tutorial.
- ♦ Version number now appears in all window title bars.
- ♦ Balloon messages have been added to the Component Preference Editor.
- ♦ Layout of the Component Preference Editor has been changed to a more logical format with parts enabled only when they are allowable.
- ♦ Multiple trace files are now allowed, one for each trace type.
- ♦ Time units have been added to the X-axis title on graphs.
- ♦ Multiple units (e.g. "[W, deg C]") have been added to Y-axis titles on graphs.
- ♦ Graph lines are now thicker to improve visibility.
- ♦ On graph legends, curves that are mapped to the Y2 axis are grouped after curves mapped to the Y1 axis.
- ♦ Yellow curve color has been changed to gold for visibility.
- ♦ The run.log file now pops up, in addition to the error.log file, if there is a run-time problem while running the solver.

Documentation

♦ The separate Windows and Unix Installation and Usage Guides have been combined into a single document called the "VisualSPARK 1.0.1 Users Guide."

♦ The Users Guide now contains an extended tutorial that shows, step-by-step, how to set up a SPARK model of an air-conditioned room with a PI temperature controller.

Input Language Parser

♦ The LINK statement now creates a variable without specifying any connections.

♦ The PORT statement has a new keyword of the form LIKE=anotherPortName. This copies the properties (including the subports) of the port named 'anotherPortName', to the port currently being defined.

Setup Program

♦ The format of the problem.cpp file generated by setup has been modified to support the runtime loading scheme. See "Changes to Solver" for more details.

Solver

♦ A runtime loading scheme has been added to the solver in order to load the problem description contained in the problem.cpp file at runtime, during startup, as opposed to during the compilation step. This overcomes a compiler limitation that was encountered with large SPARK problems and also provides a faster way of loading problems during the problem testing phase. VisualSPARK can now be used to solve very large problems consisting of a thousand or more equations.

♦ The scaling scheme was modified to compute the weighted Euclidean norm of the residual function that is displayed to the cout stream in the detailed diagnostic mode.

♦ The scale is now the absolute value of the break variable instead of the arithmetic mean of the value of the break variable and of the value returned by the inverse associated with the break variable. Thus, the residual norm is no longer limited to a maximum value of 2. This new scaling scheme also improves the line-search backtracking step control. The time units of the Clock and DT links are now overridden with the corresponding unit strings specified in the problem run file. This allows the correct units to be displayed in the header portion of the output, trace and snapshot files.

♦ In the computation of the Secant method (based on the Broyden's update formula), fixed a bug that was returning a constant positive value for any negative partial derivative.

♦ Input files are now checked at runtime to make sure that the time stamps for the input values are specified in increasing order.

♦ The SPARK library functions defined in the file spark.h are now declared as part of the SPARK namespace (still in the same header file). This is to avoid potential name collision with user-defined functions in the atomic classes. The atomic classes defined in the globalclass directory and in the hvactk/class directory have been modified accordingly by adding namespace scope resolution before the function names.

If you would like to get an idea of what the program does before you download it, you can review the *SPARK Reference Manual* and the *VisualSPARK Users Guide*, both of which can be downloaded from the VisualSPARK site. To obtain a free copy of the program and/or review the documentation, go to

http://SimulationResearch.lbl.gov > VisualSPARK

Note that you do not have to already have VisualSPARK 1.0 to obtain VisualSPARK 1.0.1.

DOE-2

DOE-2.1E (version 117) 1,000-Zone version for Windows from ESTSC

Cost is as follows:
- $ 300 U.S. Government, non-profit Educational
- $ 575 U.S., Mexico, Canada
- $ 1268 Japan only
- $ 1075 All Other Foreign

DOE-2 Documentation on a CD from ESTSC - Cost US$100

What is included on the CD?

- *DOE-2 Reference Manual* (Part 1)
- *DOE-2 Reference Manual* (Part 2)
- *DOE-2 Supplement to the Reference Manual (2.1E)*
- *DOE-2 BDL Summary (2.1E)*
- *DOE-2 Engineers Manual (2.1A)*

Order Software and ESTSC Documentation

Ed Kidd
NCI Information Systems, Inc.
Energy Science and Technology Software Center (ESTSC)
P.O. Box 1020
Oak Ridge, TN 37831

Phone: 865/576-1037
Fax: 865/576-6436
Email: estsc@adonis.osti.gov

Free DOE-2 Documentation (http://SimulationResearch.lbl.gov > DOE-2 > Documentation)

- *DOE-2 Basics (2.1E)*

- Update Package #1:
  DOE-2.1E Basics, the *Supplement* and *BDL Summary*

- Update Package #2: (Version 107, DOE-2.1E)
  BDL Summary and *Supplement*

- Update Package #3:
  Appendix A of the *Supplement*

- Update Package #4: (1000-zone DOE-2.1E)
  BDL Summary (pdf)

DOE-2 Basics and Update Packages 1, 2, 3 and 4, not included on the ESTSC CD, consist of scanned pdf files and may be downloaded from our web site. You may also request the same information on a CD by sending email to klellington@lbl.gov.

The files need to be printed and the update pages inserted into the existing DOE-2 manuals.

Note that Update Packages are **not** cumulative and each one contains different information. You have to download all four packages to update the DOE-2 documentation completely.

DOE-2 Modeling Tips is a compilation of all the "how to" articles from the *Building Energy Simulation User News* (through 2001)*.*

Purchase DOE-2 Documentation

DOE-2 Sample Run Book (2.1E) -- The *Sample Run Book* is the only remaining DOE-2 manual not available electronically. It must be purchased separately from NTIS; information is at http://SimulationResearch.lbl.gov > DOE-2 > Documentation

EnergyGauge®

Energy and Economic Analysis Software

Update on the EnergyGauge® USA Program

by Danny Parker and the EnergyGauge Development Team

EnergyGauge USA, a product of the Florida Solar Energy Center (FSEC), is a user-friendly but highly sophisticated home energy simulation software tool. It uses DOE-2.1E to simulate energy use and provides for the combined evaluation of both the energy use and the economic and financial impacts of home energy-efficiency decision-making.

Danny Parker writes: we have successfully implemented hourly modeling of domestic solar water heating (SDHW) systems and rooftop and building integrated PV systems in Version 2.0 of EnergyGauge USA. The SDHW prediction is based on an hourly correlation to TRNSYS results which produces very similar values when implemented as a function within DOE-2. The hourly PV system performance is estimated using PVFORM with electrical loads passed from DOE-2. The PV modeling with power production matched against aggregate HVAC and end-use appliance loads is a new and very powerful capability of the software.

Following are abstracts from two FSEC technical papers that explore EnergyGauge. For complete information, please visit www.energygauge.com.

Validation of EnergyGauge® USA Using the HERS BESTEST Procedure
by P. Fairey, R. K. Vieira and D. S. Parker

Abstract: This report presents results from the testing and validation of the EnergyGauge USA home energy rating software conducted using the HERS BESTEST procedures. The results show that EnergyGauge USA is an excellent and verifiable simulation program that is capable of meeting all national requirements for home energy rating software tools.
www.fsec.ucf.edu/%7Ebdac/pubs/bestest/rr55.htm

Evaluation of EnergyGauge® USA, A Residential Energy Design Software Program, Against Monitored Data
by B. S. Fuehrlein, S. Chandra, D. Beal, D. S. Parker and R. K. Vieira

Abstract: A new software program, EnergyGauge® USA, has been developed for the calculation of energy use in residential buildings. A simplified user interface allows buildings to be quickly defined and evaluated. Utilization of the DOE-2.1E energy simulation engine brings the computing power of hourly simulation to designers and raters.
www.fsec.ucf.edu/%7Ebdac/pubs/valid/pf357.htm

Home Depot Stocks New Ceiling Fan Invented by FSEC's Danny Parker

A ceiling fan, invented by FSEC researcher Danny Parker, and produced and marketed under the name Gossamer Wind Series, went on sale at Home Depot stores across the nation in 2001. The innovative blade design is 40 percent more energy efficient than a conventional ceiling fan. Parker fashioned the blades after an airplane propeller. The twisted and tapered airfoil blades are designed to cut effortlessly through the air, reducing the amount of turbulence and lost energy produced by conventional ceiling fans. The improved ceiling fan blades were developed in cooperation with AeroVironment Inc. of Monrovia, CA, which specializes in advanced aeronautical design for NASA.

For more information, go to http://www.fsec.ucf.edu/ About/WhatsNew.htm
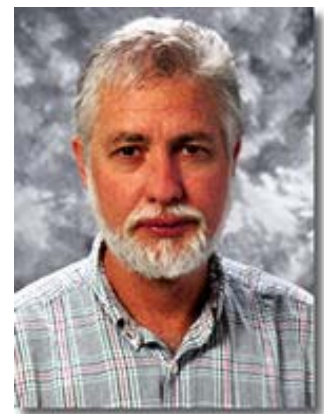
FSEC researcher Danny Parker

Recent Reports

LBNL-45949

Model-Based Performance Monitoring: Review of Diagnostic Methods and Chiller Case Study

P. Haves and S. K. Khalsa
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
The paper reviews the variety of technical approaches to the problem of detecting and diagnosing faulty operation in order to improve the actual performance of buildings. The review covers manual and automated methods, active testing and passive monitoring, the different classes of models used in fault detection, and methods of diagnosis. The process of model-based fault detection is then illustrated by describing the use of relatively simple empirical models of chiller energy performance to monitor equipment degradation and control problems. The CoolTools™ (www.hvacexchange.com/cooltools/) chiller model identification package is used to fit the DOE-2 chiller model to on-site measurements from a building instrumented with high quality sensors. The need for simple algorithms to reject transient data, detect power surges and identify control problems is discussed, as is the use of energy balance checks to detect sensor problems. The accuracy with which the chiller model can be expected to predict performance is assessed. A case study is described in which the model was applied retroactively to high-quality data collected in a San Francisco office building as part of a related project.

LBNL-48629

Comparative Guide to Emerging Diagnostic Tools for Large Commercial HVAC Systems

H. Friedman and M. A. Piette
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
This guide compares emerging diagnostic software tools that aid detection and diagnosis of operational problems for large HVAC systems. We have evaluated six tools for use with energy management control system (EMCS) or other monitoring data. The diagnostic tools summarize relevant performance metrics, display plots for manual analysis, and perform automated diagnostic procedures. Our comparative analysis presents nine summary tables with supporting explanatory text and includes sample diagnostic screens for each tool.

LBNL-45548

An Expandable Software Model for Collaborative Decision-Making During the Whole Building Life Cycle

K. Papamichael, V. Pal, N. Bourassa,
J. Loffeld and G. Capeluto
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
Decisions throughout the life cycle of a building, from design through construction and commissioning to operation and demolition, require the involvement of multiple interested parties. The performance of alternative designs and courses of action must be assessed with respect to multiple performance criteria, such as comfort, aesthetics, energy, cost and environmental impact. Several stand-alone computer tools are currently available that address specific performance issues during various stages of a building's life cycle. Some of these tools support collaboration by providing means for synchronous and asynchronous communications, performance simulations, and monitoring of a variety of performance parameters involved in decisions about a building during building operation. However, these tools are not linked in any way, so significant work is required to maintain and distribute information to all parties. In this paper we describe a software model that provides the data management and process control required for collaborative decision making throughout a building's life cycle. The requirements for the model are delineated addressing data and process needs for decision making at different stages of a building's life cycle. The software model meets these requirements and allows addition of any number of processes and support databases over time. What makes the model infinitely expandable is that it is a very generic conceptualization (or abstraction) of processes as relations among data. The software model (1) supports multiple concurrent users, and facilitates discussion and debate leading to decision making, (2) allows users to define rules and functions for automating tasks and alerting all participants to issues that need attention, (3) supports management of simulated and real data and (4) continuously generates information useful for improving performance prediction and understanding of the effects of proposed technologies and strategies.

Recent Reports

LBNL-47948

Integrating Advanced Facades into High Performance Buildings

Stephen E. Selkowitz,
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
Glass is a remarkable material but its functionality is significantly enhanced when it is processed or altered to provide added intrinsic capabilities. The overall performance of glass elements in a building can be further enhanced when they are designed to be part of a complete façade system and the façade system delivers the greatest when it becomes an essential element of a fully integrated building design. This presentation examines the growing interest in incorporating advanced glazing elements into more comprehensive façade and building systems in a manner that increases comfort, productivity and amenity for occupants, reduces operating costs for building owners, and contributes to improving the health of the planet by reducing overall energy use and environmental impacts.

LBNL-44422

U-Values of Flat and Domed Skylights

J. H. Klems
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
Data from nighttime measurements of the net heat flow through several types of skylights is presented. A well-known thermal test facility was reconfigured to measure the net heat flow through the bottom of a skylight/light well combination. Use of this data to determine the U-factor of the skylight is considerably more complicated than the analogous problem of a vertical fenestration contained in a test mask. Correction of the data for heat flow through the skylight well surfaces and evidence for the nature of the heat transfer between the skylight and the bottom of the well is discussed. The resulting measured U-values are presented and compared with calculations using the WINDOW 4 and THERM programs.

LBNL-47544

Simulating the Operation of Photosensor-Based Lighting Controls

C. Erlich, K. Papamichael ,J. Lai and K. Revsan
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
Energy savings from the use of daylighting in commercial buildings are realized through implementation of photoelectric lighting controls that dim electric lights when sufficient daylight is available to provide adequate workplane illumination. The dimming level of electric lighting is based on the signal of a photosensor. This paper presents a method that simulates the performance of photosensor controls considering the acceptance angle, angular sensitivity, placement of the photosensor within a space, and color correction filter.

LBNL-49018

A Method for Simulating the Performance of Photosensor-Based Lighting Controls

C. Erlich, K. Papamichael, J. Lai and K. Revsan
Building Technologies Department
Lawrence Berkeley National Laboratory

Abstract:
The unreliability of photosensor-based lighting controls continues to be a significant market barrier that prevents widespread acceptance of daylight dimming controls in commercial buildings. Energy savings from the use of daylighting in commercial buildings is best realized through the installation of reliable photoelectric lighting controls that dim electric lights when sufficient daylight is available to provide adequate background and/or task illumination.

Newsletter Roundup

Newsletters are a great way to keep up to date on news within the building energy efficiency community. Here is our "short list" of the best.

Advanced Buildings   http://greenbuilding.ca/GBIC.htm
Newsletter of the Royal Architectural Institute of Canada. Building simulation activities in Canada..

CADDET   http://www.caddet.co.uk/
IEA's international newsletter on energy efficiency. Practical and innovative articles by international energy researchers and practitioners.

e-FFICIENCY NEWS   http://www.ase.org/about/about.htm
The bi-monthly electronic newsletter from the Alliance to Save Energy.

Energy User News   http://www.energyusernews.com
Trade publication covers energy efficiency in new and existing non-residential buildings.

EREN News   http://www.eren.doe.gov/newsletter/archive.html
Energy Efficiency and Renewable Energy Network of the U.S. Department of Energy. EREN Network News is a weekly electronic newsletter covering energy efficiency and renewable energy news.

Green Energy News   http://www.nrglink.com/index.html
Weekly online publication offers news about energy efficiency and related "green" energy issues for non-residential facilities, etc.

IAEEL Newsletter   http://www.iaeel.org
International Association for Energy-Efficient Lighting. Lighting research and discussions of lighting energy efficiency and safety issues.

IBPSA News   http://www.mae.okstate.edu/ibpsa/newslett.htm
Newsletter of the International Building Performance Simulation Association (IBPSA). Technical articles about innovative building simulation techniques.

Lighting Design Lab   http://www.northwestlighting.com/ldl
Lighting lab activities in the Pacific Northwest. Lots of workshops and classes listed.

Lighting Futures   http://www.lrc.rpi.edu/Futures/index.html
Articles on emerging lighting technologies. Great resource list of lighting web sites and contacts.

Setting the Standard   http://www.energycodes.gov/news/
Newsletter of the U.S. Department of Energy's Building Standards and Guidelines Program.

WINDOW 5.0 is a publicly available computer program used for calculating total window thermal performance indices (i.e., U-values, solar heat gain coefficients, shading coefficients, and visible transmittances). WINDOW 5.0 provides a versatile heat transfer analysis method consistent with the updated rating procedure developed by the National Fenestration Rating Council (NFRC) that is consistent with the ISO 15099 standard. The program can be used for the design and development of new products, to assist educators in teaching heat transfer through windows, and to develop building energy codes.

WINDOW 5.0 is a significant upgrade to the LBNL WINDOW 4.1 program; it includes all of the WINDOW 4.1 capabilities as well as these enhancements:

- A state of the art Microsoft Windows™ interface
- Updated algorithms for the calculation of total fenestration product U-values and Solar Heat Gain Coefficient consistent with ASHRAE SPC142, ISO15099, and the National Fenestration Rating Council
- A Condensation Resistance Index in accordance with the NFRC 500 Standard
- A surface temperature map
- An integrated database of properties
- Output of a window data file for use in EnergyPlus ver. 1.0.1 and later
- links to other LBNL window analysis software:
    - THERM 5 for calculating 2-D frame and edge effects
    - RESFEN   for calculating the energy effects of windows in typical houses throughout the United States
    - Optics5   for the optical properties of all coated and uncoated glazings, laminates, and applied films.

http://windows.lbl.gov/software/window/window_getacopy.asp

DoeRayMe

You are invited to test **DoeRayMe**, a new DOE-2.1E screening tool application currently being developed by Jason Glazer, P. E., of GARD Analytics, Inc. **DoeRayMe** is a simple and flexible interface that uses a specially developed DOE-2 input file (template) that contains special codes describing the parameters available to be changed in the user interface. This allows new screening tools to be developed by any DOE-2 user. Please visit the **DoeRayMe** web site at http://www.gard.com/DoeRayMe.

DOE-2 Training — Private or group DOE-2 courses for beginning and advanced users: Contact Marlin Addison at (602) 968-2040, or send email to marlin.addison@doe2.com

GenOpt 1.1
Generic Optimization Program

New in *GenOpt* 1.1 are an additional algorithm for multi-dimensional optimization, algorithms for one-dimensional optimization, and an algorithm for parametric runs in a multi-dimensional space. The new version allows processing of multiple function values and has an improved graphical user interface.

GenOpt **is a multi-parameter optimization program, available free of charge from LBNL. It automatically finds the values of user-selected design parameters that minimize a *cost function*, such as annual energy use, calculated by an external simulation program like EnergyPlus, SPARK, DOE-2, BLAST, TRACE, TRNSYS, etc.** *GenOpt* **can be used with any simulation program that has text-based input and output. It also offers an interface for adding custom optimization algorithms to its library.**

GenOpt **1.1 (with user manual) may be downloaded free of charge from**

http://SimulationResearch.lbl.gov > GenOpt

Join the BLDG-SIM Mail ing List

BLDG-SIM is a mailing list for users of building energy simulation programs like EnergyPlus, DOE-2, Trace-600, HAP, BLAST, ESP, SERIRES, TRNSYS, TASE, ENERGY-10 and others. Because building simulation professionals are located worldwide, the BLDG-SIM list is an attempt to foster the development of a community of those users. Users of all levels of expertise are welcome and are encouraged to share their questions and insights about these programs.

The web page for BLDG-SIM is http://www.gard.com/bldg-sim.htm

Jason Glazer, P.E., Of GARD Analytics, Inc. Is the list administrator (jglazer@gard.com).

Lights ...*!!*   Camera ...*!!*   HVAC ??

As we first reported last year, the Consumer Energy Center of the California Energy Commission started an ambitious project to create training videos for building energy professionals. They now offer videos about structural insulated panels, fenestration, fiberglass/cellulose/spray foam insulation, HVAC, cool roofs and both radiant and (house wrap) air barriers. The videos take the form of informal conversations between building professionals, who demystify and discuss the subject. Even though their emphasis is on residential and small buildings, the web site is worth exploring, go to:.

http://www.consumerenergycenter.org/videos/

ENERGY-10, Version 1.3 with WeatherMaker

Version 1.3 of ENERGY-10 is now available. It includes the much-anticipated *WeatherMaker* function. *WeatherMaker* allows users to create their own weather files based on information available from nearly 4,000 weather stations throughout the U.S. Revisions to the program itself include some minor fixes, an improved and expanded Help section, and greater clarity in titling and identification of various sections. Contact the Sustainable Buildings Industries Council for more information, or to order your upgrade disc (the cost is $15, which covers production and shipping).

ENERGY-10, written in C^{++}, is a design tool for smaller residential or commercial buildings that are less than 10,000 ft^2 floor area, or buildings that can be treated as one- or two-zone increments. It performs whole-building energy analysis for 8760 hours/year, including dynamic thermal and daylighting calculations. ENERGY-10 was specifically designed to facilitate the evaluation of energy-efficient building features in the very early stages of the design process.

Input: Only four inputs required to generate two initial generic building descriptions. Virtually everything is defaulted but modifiable. As the design evolves, the user adjusts descriptions using fill-in menus (utility-rate schedules, construction details, materials).

Output: Summary table and 20 graphical outputs available, generally comparing current design with base case. Detailed tabular results also available.

Platform: PC-compatible, Windows 3.1/95/98, Pentium processor with 16 MB of RAM is recommended.

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Sustainable Buildings Industry Council (SBIC)

SBIC Workshops

April 18-19, 2002	Low-Energy, Sustainable Building Design for Federal Managers (Golden, CO)
April 24-25, 2002	High Performance Schools (Indianapolis, IN)
May 8, 2002	Designing Low-Energy Buildings with ENERGY-10 (Charlotte, NC)
April 18-19, 2002	Low-Energy, Sustainable Building Design for Federal Managers (Golden, CO)

ENERGY-10 User Group at http://www.sbicouncil.org/forum

SBIC Bookstore at http://www.sbicouncil.org/store/resources.php#pubs
- ✓ *High Performance School Buildings Resource & Strategy Guide*
- ✓ *Low-Energy Sustainable Building Design for Federal Managers*
- ✓ *Designing Low-Energy Buildings With ENERGY-10*
- ✓ *Guidelines for Home Building*
- ✓ *Mastering ENERGY-10*

Building Design Advisor 2.0

Decision making through the integrated use of multiple simulation tools and databases

The **Building Design Advisor (BDA)** is a Windows® program that addresses the needs of building decision-makers from the initial, schematic phases of building design through the detailed specification of building components and systems. The BDA is built around an object-oriented representation of the building and its context, which is mapped onto the corresponding representations of multiple tools and databases. It then acts as a ***data manager*** and ***process controller***, automatically preparing input to simulation tools and integrating their output in ways that support multi-criterion decision-making. Version 3.0 of the BDA is now available for Beta testing and includes links to three main simulation tools for daylighting, electric lighting and energy analyses:

- **DCM**, a simplified daylighting simulation tool,
- **ECM**, a simplified electric lighting simulation tool, and
- the **DOE-2.1E** building energy simulation program.

ECM, the **new electric lighting simulation tool** in BDA 3.0 beta, is integrated through BDA with DOE-2. BDA's Schematic Graphic Editor allows placement of electric lighting luminaires and specification of reference points for daylight-based electric lighting controls. Moreover, BDA now has the capability of **running DOE-2 parametrically** to generate a plot that shows the relationship between effective aperture and energy requirements. BDA 3.0 beta provides the added functionality of working with either **English units or Metric units**.

Current research and development efforts are focused on the development of links to **Desktop Radiance**, a Windows 95/98/NT version of the **Radiance** lighting/daylighting simulation and rendering software.

The minimum and recommended system **requirements** to run the BDA software are as follows:

Minimum	Recommended
Pentium 75	Pentium 200 or better.
Windows 95, 98, NT 4.0.	Windows 95, 98, NT 4.0.
16 / 32MB RAM under Windows 95	24 / 64MB RAM under Windows NT 4.0.
30 MB of larger hard disk space.	60 MB of larger hard disk space.
640x480 or higher screen resolution.	1024x768 or higher screen resolution.

The BDA source code is available for licensing; if interested, please contact Dr. Papamichael at K_Papamichael@lbl.gov. To learn more about the BDA software and to download a copy of the latest public version (BDA 2.0), go to http://gaia.lbl.gov/BDA

For Beta Testing of BDA 3.0, contact Vineeta Pal at VPal@lbl.gov.

Knowledge helps you make a living, Wisdom helps you make a life.

The Lowdown on Downloads from Lawrence Berkeley National Laboratory

Free Downloads

BDA 2.0 (Building Design Advisor) *A beta version of 3.0 is also available from vpal@lbl.gov*	**gaia.lbl.gov/BDA**
COMIS (multi-zone air flow and contaminant transport model)	**www-epb.lbl.gov/comis**
EnergyPlus 1.0 (new-generation whole-building energy analysis program, based on BLAST and DOE-2)	**www.energyplus.gov** --or-- **SimulationResearch.lbl.gov > EnergyPlus**
GenOpt®1.1 (generic optimization program)	**SimulationResearch.lbl.gov > GenOpt**
RADIANCE (analysis and visualization of lighting in design) **Desktop Radiance** (integrates the Radiance Synthetic Imaging System with AutoCAD Release 14)	**radsite.lbl.gov/radiance/** **radsite.lbl.gov/deskrad/**
RESEM (Retrofit Energy Savings Estimation Model) (calculates long-term energy savings directly from actual utility data)	**eetd.lbl.gov/btp/resem.htm**
SUPERLITE (calculates illuminance distribution for room geometries)	**eetd.lbl.gov/btp/superlite2.html**
THERM 2.1a (model two-dimensional heat-transfer effects in building components where thermal bridges are of concern)	**windows.lbl.gov/software/therm/therm.html**
VisualSPARK 1.0.1 (Simulation Problem Analysis and Research Kernel) (connect component models to simulate innovative building envelope and HVAC systems)	**SimulationResearch.lbl.gov > VisualSPARK**
WINDOW 5 (thermal analysis of window products)	**windows.lbl.gov/software/window/ window.html**

Free Software / Request by Fax from 510.486.4089

RESFEN 3.1 (choose energy-efficient, cost-effective windows for a given residential application)	**windows.lbl.gov/software/resfen/resfen.html**

Web Based

Home Energy Saver (quickly compute home energy use) and **Home Improvement Tool** (simplified Home Energy Saver)	**hes.lbl.gov** and **hit.lbl.gov**

Purchase

ADELINE 2.0 (daylighting performance in complex spaces)	**radsite.lbl.gov/adeline/**

DOE-2 Help Desk

Email, phone or fax the Simulation Research Group with your questions (klellington@lbl.gov).
Phone: (510) 486-5711, Fax: (510) 486-4089

BLAST*news*

www.bso.uiuc.edu

**Building Systems Laboratory, 30 Mech Eng Bldg.
University of Illinois, 1206 West Green Street
Urbana, IL 61801
Tel: (217) 333-3977 - Fax: (217) 244-6534
support@blast.bso.uiuc.edu**

The **Building Loads Analysis and System Thermodynamics (BLAST** program predicts energy consumption, energy system performance and cost for new or existing (pre-retrofit) buildings.

BLAST contains three major sub-programs:

- **Space Load Prediction** computes hourly space loads in a building based on weather data and user inputs detailing the building construction and operation.

- **Air Distribution System Simulation** uses the computed space loads, weather data, and user inputs.

- **Central Plant Simulation** computes monthly and annual fuel and electrical power consumption.

Heat Balance Loads Calculator (HBLC)
The BLAST graphical interface (HBLC) is a Windows-based interactive program for producing

BLAST input files. You can download a demo version of HBLC (for MS Windows) from the BLAST web site (User manual included).

HBLC/BLAST Training Courses
Experience with the HBLC and the BLAST family of programs has shown that new users can benefit from a session of structured training with the software. The Building Systems Laboratory offers such training courses on an as needed basis typically at our offices in Urbana, Illinois.

WINLCCID 98
LCCID (Life Cycle Cost in Design) was developed to perform Life Cycle Cost Analyses (LCCA) for the Department of Defense and their contractors.

To order BLAST-related products, contact the Building Systems Laboratory at the address above.

Program Name	Order Number	Price
PC BLAST Includes: BLAST, HBLC, BTEXT, WIFE, CHILLER, Report Writer, Report Writer File Generator, Comfort Report program, Weather File Reporting Program, Control Profile Macros for Lotus or Symphony, and the Design Week Program. The package is on a single CD-ROM and includes soft copies of the BLAST Manual, 65 technical articles and theses related to BLAST, nearly 400 processed weather files with a browsing engine, and complete source code for BLAST, HBLC, etc. Requires an IBM PC 486/Pentium II or compatible running MS Windows 95/98/NT.	3B486E3-0898	$1500
PC BLAST Package Upgrade from level 295+	4B486E3-0898	$450
WINLCCID 98: executable version for 386/486/Pentium	3LCC3-0898	$295
WINLCCID 98: update from WINLCCID 97	4LCC3-0898	$195
The last four digits of the catalog number indicate the month and year the item was released or published. This will enable you to see if you have the most recent version. All software will be shipped on 3.5" high density floppy disks unless noted otherwise.		

FREE Membership in 2002!!!

Pacific Gas and Electric Company

PG&E Spring 2002 Programs

To register call 415.973.7268 or go to www.pge.com/pec

HVAC

April 10	**Designing Underfloor Air Systems** -- Issues and design strategies for HVAC systems using underfloor air distribution.
April 24	**Capturing Motor Efficiency Opportunities -** Identify and analyze energy conservation opportunities involving their motors and driven equipment. Participants will learn how to use the MotorMaster+ software to adopt motor specifications and design purchase policies, to identify and replace problem motors, to design cost-effective "repair versus replace" practices, to appropriately deal with oversized and underloaded motors, and to know when to immediately replace an operable motor.

WHOLE-BUILDING PERFORMANCE

April 18	**Building Energy Audits** - An overview of energy auditing techniques, tools, and software including building benchmarking, billing data analysis, identifying energy conservation opportunities, and cost and payback calculations, and the use of monitoring equipment through a series of hands-on exercises.
April 25	**Data Collection for Packaged Units** – Energy-saving opportunities available for maintaining or retrofitting packaged HVAC units; specifically economizer performance, compressor cycling, evaporative cooling, and the manufacturer's efficiency rating.

ARCHITECTURE

April 2 **April 30**	**Integrated Building Design** - Discover how design decisions related to external shading, building envelope, glazing, HVAC systems, electric lighting and daylighting can be integrated to create comfortable and energy-efficient indoor environments.
April 11 **May 3**	**Daylighting Fundamentals** - Fundamental principles of daylighting design used to achieve high-quality lighting, lively building interiors, and energy savings.

LIGHTING

April 2	**Lighting Design for Architects -** Lighting concepts for architects, including terminology, visual perception, surface properties, light and color theory, equipment, design criteria, and applied design.
April 23	**Lighting Fundamentals** - Lighting designer Tom Tolen will use the Energy Center's lighting classroom to demonstrate basic concepts, terminology, light and color theory, electric light sources, luminaire design, controls, calculations, and economics.